

SIX-LETTER TRANSPOSALS

A. ROSS ECKLER

Morristown, New Jersey

The transposal of PROSE into SPORE is exactly the same as the transposal of OLIVE into VOILE: both can be represented by the transformation 12345 - 41325, which says that the letter in first position is moved to second position, the letter in second position is moved to fourth position, and so on to the letter in fifth position which remains fixed. To save space, the transformation is written 41325.

The inverse transposal, SPORE into PROSE, is represented by a different transformation, 24315. However, not all transposal-pairs lead to two different transformations; CORAL into CAROL is represented by 14325, as is CAROL into CORAL. This occurs whenever each letter in the word either remains fixed (as C, R, L) or changes position with another letter (as A and O).

The number of different n -letter transformations is one less than the number of distinct ways n different letters can be arranged in a row: $n(n-1)(n-2) \dots 2 \cdot 1$, denoted by the symbol $n!$ (factorial n). It is an interesting task to try and find transposal-pairs which illustrate each possible transformation. Because many transposal-pairs can be used to illustrate two transformations, the number of different transposal-pairs that must be found is smaller than $n!$ -- 1, 4, 16, 72 and 397 for words of two, three, four, five and six letters. Ralph Beaman has derived an iterative formula for $T(n)$, the number of different transposal-pairs:

$$T(n) = T(n-1) + (n-1)T(n-2) + (n-1)!(1/2)(n-2) + (n-1)$$

valid for $n = 3$ or more (to prime the pump, set $T(1) = 0$, $T(2) = 1$).

A complete set of five-letter transposal-pairs is listed in the February 1970 Word Ways. When Dennis Ritchie of Bell Telephone Laboratories compiled a transposal list of words in Webster's Second, it became possible to prepare an analogous set of six-letter transposal-pairs. In the table below, each transformation (or pair of transformations) is followed by the commonest transposal-pair known; all words can be found in Webster's Second or Third Unabridged. The hardest transposal-pairs to find were EDISON - DEINOS, ORANGS - GARSON and ARISEN - REINAS.

123465 minuet minute
 123546 barely barley
 123654 clones closen
 124356 united untied
 124365 stored strode
 125436 incest insect
 125634 cretin crinet
 126453 wander warden
 126543 pilots pistol
 132456 sawyer swayer
 132465 bruise buries
 132546 crusty curtsy
 132654 sander snared
 143256 stanch snatch
 143265 sorted strode
 145236 barley bleary
 146253 throes tosher
 153426 sprite stripe
 153624 pearly player
 154326 petals plates
 156423 rictus rustic
 163452 sprout stroup
 163542 antres astern
 164352 caudle cedula
 165432 closer cresol

213456 action cation
 213465 lustre ulster
 213546 afield failed
 213654 Edison deinos
 214356 estrum sertum
 214365 noised onside
 215436 nudity untidy
 215634 nautic anicut
 216453 insoul Nilous
 216543 lucite uletic
 321456 marble ramble
 321465 merist remits
 321546 derail redial
 321654 itself stiffl
 341256 brumal umbral
 341265 feints infest
 351426 cartel rectal
 351624 corset rectos
 361452 borate rebato
 361542 restio sorite
 423156 danger gander
 423165 airted tirade
 425136 unlist insult
 426153 danger garden
 432156 civets evicts

432165 abides dibase
 453126 insure ursine
 456123 German manger
 463152 hestia tashie
 465132 blosmy symbol
 523416 course source
 523614 Cyrano Nyroca
 524316 conure rounce
 526413 shirty thyrsi
 532416 treads derats
 532614 oranges garson
 543216 rebuts tubers
 546213 nigers resing
 563412 anemic iceman
 564312 almost stomal
 623451 danger ranged
 623541 daleth halted
 624351 duties suited
 625431 signal liangs
 632451 dialer railed
 632541 coxite exotic
 643251 drones snored
 645231 creant tanrec
 653421 deltas salted
 654321 drawer reward

123564 123645 retain retina
 124536 125346 trades treads
 124563 126345 resign reigns
 124635 125364 steady stayed
 124653 126354 cheats chaste
 125463 126435 resing renigs
 125643 126534 forest foster
 132564 132645 breath Bertha
 134256 142356 stored sorted
 134265 142365 rouges rugose
 134526 152346 pearly parley
 134562 162345 fringe finger
 134625 152364 purism primus
 134652 162354 claret cartel
 135246 142536 points pitons
 135264 142635 thurse tusher
 135426 152436 pleats petals
 135462 162435 stinge signet
 135624 152634 geodal goaled
 135642 162534 friend finder
 136245 142563 roamed radome
 136254 142653 player parley
 136425 152463 glider girdle
 136452 162453 plates pastel

136524	152643	points piston	236415	512463	oleins lesion
136542	162543	Croats costar	236451	612453	routes ouster
143526	153246	argues augers	236514	512643	tinsel inlets
143562	163245	orange onager	236541	612543	shamer harems
143625	153264	Romans ransom	241356	314256	grouse rugose
143652	163254	result rustle	241365	314265	gluier ligure
145263	146235	strife sifter	241536	315246	hoaxed oxhead
145326	154236	bleary barely	241563	316245	regain earing
145362	164235	cerous course	241635	315264	pleads lapsed
145623	156234	lupine lineup	241653	316254	orchid rhodic
145632	165234	breath bather	243156	413256	ascent secant
146325	154263	petals pastel	243165	413265	aflush Fulahs
146352	164253	canoer cornea	243516	513246	signet ingest
146523	156243	merits mister	243561	613245	throne hornet
146532	165243	stupor sprout	243615	513264	obtuse buteos
153462	163425	mental mantle	243651	613254	stared trades
153642	163524	unripe uprein	245136	415236	cleans lances
154362	164325	meatus mutase	245163	416235	odeums dumose
154623	156324	medial mailed	245316	514236	triune runite
154632	165324	crones censor	245361	614235	stared treads
156342	164523	bather Bertha	245613	516234	uprose poseur
156432	165423	detail dilate	245631	615234	scored credos
164532	165342	presto poster	246135	415263	friend redfin
213564	213645	parson aprons	246153	416253	ladies aisled
214536	215346	punted uptend	246315	514263	spirea praise
214563	216345	cinema iceman	246351	614253	nomial oilman
214635	215364	Danite adient	246513	516243	unleft netful
214653	216354	Abdiel bailed	246531	615243	shriek hikers
215463	216435	ration aroint	251346	314526	thread hatred
215643	216534	ardent ranted	251364	314625	prates repast
231456	312456	smiled misled	251436	315426	virent invert
231465	312465	clouts locust	251463	316425	ratios aorist
231546	312546	tholes hotels	251634	315624	uredos roused
231564	312645	bridal ribald	251643	316524	streak tasker
231645	312564	presto repost	253146	413526	crates reacts
231654	312654	abides biased	253164	413625	albeit libate
234156	412356	plumed lumped	253416	513426	traces reacts
234165	412365	ablest bleats	253461	613425	silent inlets
234516	512346	ranges angers	253614	513624	arisen reinas
234561	612345	stable tables	253641	613524	lumina unmail
234615	512364	sprite priest	254136	415326	stoner tensor
234651	612354	simple impels	254163	416325	thenal hantle
235146	412536	others throes	254316	514326	tholes helots
235164	412635	sterno tensor	254361	614325	traces recast
235416	512436	towels owlets	254613	516324	hating anight
235461	612435	tuners unrest	254631	615324	thoral harlot
235614	512634	ostler sterol	256134	415623	plenum lumpen
235641	612534	cation atonic	256143	416523	scythe chesty
236145	412563	pliers lisper	256314	514623	amides mesiad
236154	412653	spacer parsec	256341	614523	scared cedars

256413	516423	luting ungilt	342165	431265	pastel staple
256431	615423	filets itself	342516	531246	insult sunlit
261345	314562	boater orbate	342561	631245	slider idlers
261354	314652	German engram	342615	531264	sprite ripest
261435	315462	Daniel aldine	342651	631254	enfold fondle
261453	316452	cotise oecist	345126	451236	debris brides
261534	315642	ascent stance	345162	461235	velour louvre
261543	316542	listen inlets	345216	541236	escort corset
263145	413562	famuli aimful	345261	641235	solemn lemons
263154	413652	spinor prison	345612	561234	stable ablest
263415	513462	isotac scotia	345621	651234	depart parted
263451	613452	spider prides	346125	451263	camels mescal
263514	513642	spiter priest	346152	461253	Olenus ensoul
263541	613542	soiler oriels	346215	541263	faster strafe
264135	415362	pseudo souped	346251	641253	coheir heroic
264153	416352	unable nebula	346512	561243	deacon acnode
264315	514362	nailer Arline	346521	651243	master stream
264351	614352	sauger argues	351462	361425	median damine
264513	516342	noetic octine	351642	361524	domnei medino
264531	615342	dances ascend	352146	431526	tubers brutes
265134	415632	triose Restio	352164	431625	Teucric uretic
265143	416532	strone tensor	352416	531426	dogies geoids
265314	514632	moused odeums	352461	631425	yogurt grouty
265341	614532	spinal plains	352614	531624	cashel sealch
265413	516432	arkose resoak	352641	631524	ladies deasil
265431	615432	strone tenors	354126	451326	potman tampon
321564	321645	listen silent	354162	461325	unstar Saturn
324156	421356	halter lather	354216	541326	triens inerts
324165	421365	lustre sutler	354261	641325	turbos robust
324516	521346	ulcers Clerus	354612	561324	ambled beldam
324561	621345	sample maples	354621	651324	denial nailed
324615	521364	hamlet Malthe	356124	451623	sector corset
324651	621354	Daniel nailed	356142	461523	escrow cowers
325146	421536	vowels wolves	356214	541623	lapsed pedals
325164	421635	Lawrie wailer	356241	641523	hustle sleuth
325416	521436	raptly paltry	356412	561423	starve averts
325461	621435	dotage togaed	356421	651423	deltas lasted
325614	521634	lament mantle	362145	431562	lemony myelon
325641	621534	slater alerts	362154	431652	Lesath shelta
326145	421563	timers mister	362415	531462	aldine Delian
326154	421653	gifted fidget	362451	631452	dispel slipped
326415	521463	rawest waters	362514	531642	kitsch thicks
326451	621453	sacred cadres	362541	631542	septal pleats
326514	521643	redtop deport	364125	451362	enacts ascent
326541	621543	rugate Guetar	364152	461352	usager argues
341526	351246	ashore hoarse	364215	541362	soaker arkose
341562	361245	goaled albedo	364251	641352	pretan entrap
341625	351264	medals damsel	364512	561342	insert sterin
341652	361254	spinet instep	364521	651342	rebato boater
342156	431256	ruined inured	365124	451632	rectal claret

365142	461532	Tapiro Portia	462513	536142	mushla haulms
365214	541632	escrol closer	462531	635142	santir trains
365241	641532	sailed ideals	463215	543162	gaiter triage
365412	561432	aldine denial	463251	643152	miscue cesium
365421	651432	septal plates	463512	563142	Monday dynamo
423516	523146	insult unslit	463521	653142	niters estrin
423561	623145	squeal equals	465213	546132	disbar braids
423615	523164	linked kindle	465231	645132	shelta lathes
423651	623154	ranged gander	465312	564132	chapel pleach
425163	426135	tursio suitor	465321	654132	enigma gamine
425316	524136	ethics itches	523461	623415	rumble lumber
425361	624135	snailly inlays	523641	623514	manors ransom
425613	526134	thysel shelty	524361	624315	trepan arpent
425631	625134	thecal chalet	524613	526314	Sherpa phrase
426315	524163	inputs unspit	524631	625314	dangle lagend
426351	624153	sailed ladies	526341	624513	snowed endows
426513	526143	masher harems	526431	625413	shrite theirs
426531	625143	hestia teaish	532461	632415	rialto tailor
432516	532146	hidage Adighe	532641	632514	copied epodic
432561	632145	erucin curine	532416	542316	longed engold
432615	532164	emodin domnei	534261	642315	tinger engirt
432651	632154	diaper paired	534612	562314	stride driest
435126	452136	corban Bracon	534621	652314	rental antler
435162	462135	trifle filter	536214	524613	amends desman
435216	542136	things nights	536241	642513	tinsel enlist
435261	642135	achtel Thecla	536412	562413	chandu daunch
435612	562134	staple palest	536421	652413	tophus upshot
435621	652134	deasil sailed	542361	634215	dilate tailed
436125	452163	quires risque	542631	635214	strove voters
436152	462153	traces caster	543261	643215	solemn melons
436215	542163	tailer lirate	543612	563214	result lustre
436251	642153	sarong organs	543621	653214	result luster
436512	562143	region ignore	546231	645213	tornus unsort
436521	652143	reacts caster	546312	564213	Leonid indole
452316	534126	credit direct	546321	654213	reluct cutler
452361	634125	donate atoned	562341	634512	curine neuric
452613	536124	gaskin kiangs	562431	635412	sealch chelas
452631	635124	dietal tailed	563241	643512	snatch chants
453162	463125	geison soigne	563421	653412	starch charts
453216	543126	tangue gunate	564231	645312	dearth thread
453261	643125	staple plates	564321	654312	renish shiner
453612	563124	anthem hetman	624531	625341	turbah Hubert
453621	653124	despot posted	634251	642351	sarong groans
456132	465123	tribes bestir	634521	652341	relics slicer
456213	546123	lisper perils	635241	642531	giants sating
456231	645123	serang angers	635421	652431	dearth hatred
456312	564123	armful fulmar	643521	653241	stance enacts
456321	654123	citrus rustic	645321	654231	models seldom
462315	534162	canter trance			
462351	634152	staple petals			